Mobile Agriculture

Understanding the Challenges and Opportunities for Sustainable Mobile Agriculture Solutions

Prepared for USAID's Office of Mobile Solutions

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Table of Contents

Executive Summary

Mobile phone-based technologies and services have the potential to play a major role in improving agriculture systems in developing countries, but to date few approaches have achieved the scale or financial sustainability necessary to have significant impact. This paper attempts to develop a structured analytical framework through which to understand the opportunities presented by various mobile agriculture approaches, the major components of mobile agriculture business models, the common obstacles preventing mobile agriculture programs from reaching sustainability and scale, and the most important steps international donors can take to create an enabling environment to support the development of sustainable approaches to mobile agriculture.

Section I: Mapping the Mobile Agriculture Landscape

The first step towards understanding the challenges facing mobile agriculture projects is to develop a clear picture of the many types of mobile agriculture products currently being developed in emerging markets. This paper focuses on four independent metrics, which together offer a detailed taxonomy of mobile agriculture approaches:

- The *stakeholders* involved in developing the service;
- The *technology* used to distribute the service;
- The *product or service* being offered; and
- The *revenue model* supporting the mobile service.

Section II: Examining Mobile Agriculture Business Models

The next step in exploring the potential success and sustainability of mobile agriculture products is to examine the variety of business models supporting mobile agriculture systems. This paper breaks mobile agriculture business models into the following four key elements and examines each in detail:

1. A clear and compelling *Customer Value Proposition*;
2. A robust set of *Key Resources* supporting the mobile service;
3. An understanding of the *Key Processes* necessary to deliver the service; and
4. A *Profit Formula* designed to cover costs through clear revenue streams.

Section III: Challenges to Achieving Sustainability and Scale

Mobile Agriculture systems encounter a variety of hurdles depending on their stage of product development. This report draws on a series of case studies and interviews to highlight and explore some of the most common challenges:

- **Phase 1: Proof of Concept**
  - *Trying To Do Too Much*
  - *Lack of Attention to Barriers to Adoption*
  - *Lack of User Buy-In/Ownership*
- **Phase 2: Large Scale Implementation**
  - *Failure to Leverage Multi-Sector Partnerships*
  - *Lack of Attention to Trust Deficit*
  - *Failure to Built on Existing Structures*
- **Phase 3: Widespread Adoption**
  - *Lack of Diversified Revenue Streams*
  - *Limited of Understanding of Private Sector Incentives/Concerns*
  - *Lack of Sufficient Community Feedback*

Section IV: Understanding the Role of International Donors

This report next explores the potential role of international donors to support the development of sustainable mobile agriculture projects. Drawing on nearly two dozen interviews the report lays out a simple framework of recommendations for donor action:

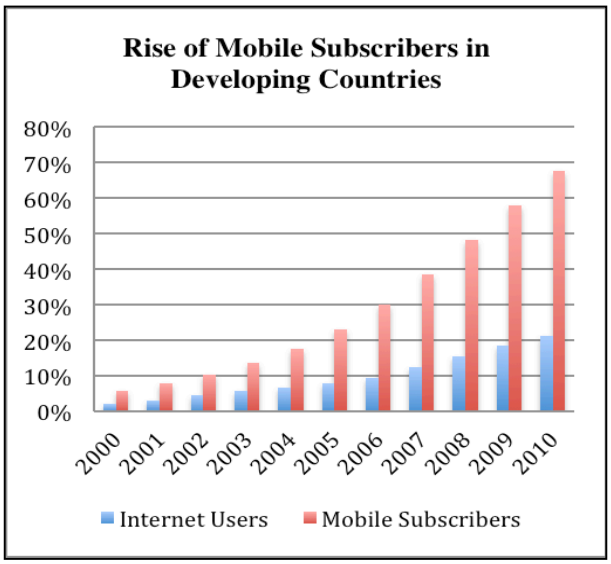
- **Phase 1: Proof of Concept**
  - Governance and Infrastructure: *Support Multi-Sector Partnerships*
  - Strategic Planning: *Map the Mobile Agriculture Landscape*
  - Community Involvement: *Support Local Mobile Innovation Challenges*
  - Evaluation and Improvement: *Develop Technical "How To" Toolkits*
- **Phase 2: Large Scale Implementation**
  - Governance and Infrastructure: *Support for Monitoring and Evaluation*
  - Strategic Planning: *Create Common Agenda/Goals*
  - Community Involvement: *Facilitate Local Community Engagement*
  - Evaluation and Improvement: *Establish Shared Metrics for Performance*
- **Phase 3: Widespread Adoption**
  - Governance and Infrastructure: *Support Improved Mobile Connectivity*
  - Strategic Planning: *Support Multi-Channel/Multi-Service Approaches*
  - Community Involvement: *Support Creation of Local Technology Centers*
  - Evaluation and Improvement: *Collect and Distribute Lessons Learned*

Introduction

Background

At some point in 2002 the number of mobile phones in the world surpassed the number of fixed line phone connections, making mobile technology the most widely used communication technology in the world. By 2008 there were an estimated four billion mobile phones in use throughout the world and two years later the number of mobile connections had grown to nearly six billion, two thirds of which were in the developing world.[1] No technology in history has ever spread faster or connected so many people throughout the world.

The rapid spread of mobile connectivity has had an especially significant impact in the developing world, particularly in rural areas. According to estimates by the International Telecommunications Union, mobile penetration rates have already reached an estimated 69% of the developing world, with some 500 million mobile subscribers Africa alone, a nearly twofold increase from 2008.[2] Falling handset and network costs have further increased the ability of low income and remote populations to access mobile services.



The spread of mobile technology throughout the developing world has already begun to have significant impact in nearly all aspects of development, enabling users to connect across large distances, access real-time information and improve coordination among large distributed groups. These connections can be particularly important in rural areas characterized by weak infrastructure, poor transportation systems and limited access to markets or information.

[1] ITU, *The World in 2010: ICT Facts and Figures*
[2] Mobile Africa 2011

Problem Statement

Despite the rapid growth of mobile connectivity throughout large parts of the developing world, the full impact of mobile connectivity in the developing world remains unclear. Over the past decade an increasing number of actors, including both public sector actors such as the World Bank and USAID as well as private and non-profit organizations such as MobileActive and the GSM Association have begun exploring the impact of information and communication technology on various aspects of international and socioeconomic development, including health, education, human rights and agriculture.

To address this information gap, this research paper has focused on one specific subset of the broader ICT4D field: the role of mobile technology in agricultural development. With some 1.5 billion people dependent on smallholder agriculture – including approximately half of the world's undernourished people [3] – the need for agricultural services and products remains high, and potential impact of mobile agriculture services appears considerable. Nevertheless, there remains little academic research being done to explore the actual impact of mobile technologies on agricultural productivity, and few concrete examples of mobile agriculture platforms that have reached significant scale or financial sustainability in the developing world.

A Note on Terminology:

The term **ICT4D** is commonly used to refer to the study of information and communication technologies for socioeconomic development. ICT4D includes a wide range of low-cost technologies, including radio, phone and internet.

This paper uses the term **mobile agriculture** to refer to those ICT4D approaches that use mobile phones to provide services or products to farmers and other rural agriculture stakeholders. For a complete listing of terms and acronyms used in the paper please refer to the Glossary.

This paper attempts to answer two main questions: 1) what is the current status of the mobile agriculture field, including both the emerging opportunities to create value for the developing world and the major challenges to reaching widespread adoption; and 2) what can major international donors and actors, including USAID, do to support the further development of the mobile agriculture field?

[3] World Development Report, *Agriculture for Development,* 2008

Organizational Structure

In order to explore this problem, this research paper is divided into four sections, each addressing a specific level of analysis. Together, these sections attempt to develop a basic roadmap of the current state of mobile agriculture efforts and highlight key recommendations and lessons learned to date. The four major sections are as follows:

- **Section I:** What is the current state of the mobile agriculture field, and what are the major stakeholders, technologies, services and business models currently being developed by mobile agriculture actors?
- **Section II:** What does a comprehensive mobile agriculture business model look like, and what are the major components and characteristics of sustainable emerging market business models in general?
- **Section III:** What are the major obstacles that mobile agriculture platforms face at each stage of product development and implementation, and what have been the key lessons learned to date?
- **Section IV:** What is the potential role for international donors to support the development of the mobile agriculture field, and what can donors do to create an environment in which mobile agriculture services develop and thrive?

Target Audience

Although written for a general audience, this paper was developed specifically for USAID's Office of Mobile Solutions and its implementing partners. As such it is targeted mainly at international donors, non-profits and development organizations hoping to gain a basic understanding of the current landscape and evolving challenges facing mobile agriculture efforts. Each section of this paper lays out a variety of simple frameworks and analytical tools designed to allow donors and field officers to quickly recognize and evaluate the potential benefits and drawbacks of various mobile agriculture approaches. The final section of this paper collects a number of recommendations on how international donors can best direct resources and energy to support the growth of sustainable and scalable mobile approaches.

Scope of Project

This paper is intended to provide an overview of the opportunities, challenges, and decision-points facing mobile agriculture, and particularly on the major obstacles preventing mobile agriculture platforms from reaching sustainability. Mobile agriculture approaches consist of a wide variety of technologies and services, and often employ a combination of various ICT technologies through a variety of channels. Although there is no single commonly used or accepted definition of mobile agriculture, this paper focuses on those projects and platforms that offer any agriculture-related service or product and that can be accessed using a mobile phone. A full analysis of the various technologies and models being developed by mobile agriculture organizations can be found in *Appendix F: Common Mobile Technologies.*

Similarly, although there are a variety of competing definitions of sustainability, this paper focuses solely on financial sustainability. In the context of mobile agriculture, this means both the ability of a project to cover the costs of its operations without relying solely on international development or humanitarian funding, as well as the ability of that project to ultimately achieve widespread adoption throughout a country or region. For this reason, this report has focused primarily on market-based solutions to agricultural services. Nevertheless, many of the projects identified in this report have reached only limited financial sustainability, and many continue to rely upon international donors and public investment.

A Note on Impact

Although it is outside the scope of this research paper, no examination of the potential impact of mobile agriculture can be complete without addressing the challenge of **impact assessment**. While still fairly limited, there are a growing number of papers and randomized control trials (RCTs) focused on understanding the direct impact of mobile agriculture projects on living standards, market efficiency and agricultural outputs. For further readings and research on this subject please see the Annotated Bibliography.

Finally, this report is meant to serve as a starting point for understanding the major trends and features of the mobile agriculture field, rather than as a comprehensive, data-driven analysis. The cases and lessons learned presented in this report are meant to serve as examples of mobile agriculture projects that are utilizing technologies,

systems and business models in innovative ways rather than as concrete solutions to mobile agriculture challenges.

Methodology

In drawing together the frameworks, case studies, lessons learned and recommendations in this report, this project has relied significantly on three main sources of information: *Academic research papers*, including impact assessments, industry white papers and academic literature reviews; *Consulting and business reports*, including industry trend reports, business model analyses and private-sector market analyses; and *Interviews*, conducted with leading researchers, implementers and private sector and mobile network operator (MNO) partners.

Many of the findings in this report have been drawn from interviews with nearly two dozen industry experts and practitioners. These interviews have focused on understanding the basic features of mobile agriculture business models; common obstacles to success; and the variety of experiences and lessons learned that practitioners have gained throughout the planning and implementation process.

In addition to these interviews, this report presents a number of case studies drawn from a variety of sources designed to provide concrete examples of the various types of successful, and less successful approaches to mobile agriculture. These case studies have been referenced throughout the report to highlight major challenges and recommendations and should be taken as a starting point for further research and not a comprehensive or exhaustive list of challenges and lessons learned.

A full list of interviews conducted, case studies and research material consulted can be found in the Appendices.

Section I: Mapping the Mobile Agriculture Landscape

Introduction

The first step towards understanding the dynamics and challenges facing mobile agriculture approaches is to develop a clear understanding of the current landscape of mobile agriculture approaches and models. Similar to the broader field of ICT4D, mobile agriculture is based on the idea that mobile connectivity can play a major role in improving the livelihoods, efficiency and productivity of the agricultural sector in developing countries.

Mobile agriculture platforms can take a huge variety of forms and functions. Simply making sense of the many varieties of mobile services being developed in agriculture is a challenge, and the number and types of technologies and approaches continues to grow and change rapidly.

In order to more easily understand the complex landscape of mobile agriculture systems it is helpful to examine them through four independent, yet related, structural frameworks. The following section explores mobile agriculture through the following four typologies:

1. By the *specific stakeholders* involved;
2. By the *type of mobile technology* utilized;
3. By the *type of service* provided; and
4. By the *revenue model* supporting the mobile system.

Direct vs. Indirect Impact

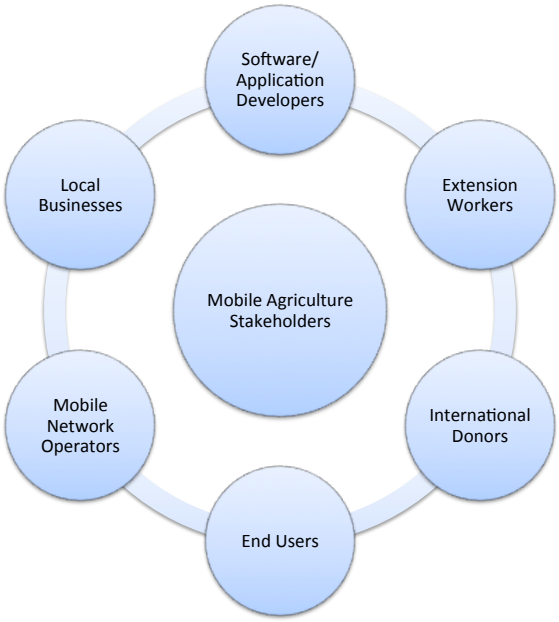
Mobile agriculture platforms can take a variety of forms, including **direct approaches**, in which mobile services are accessed directly by the farmer; and **indirect approaches**, in which mobile services allow agricultural organizations to function more effectively, hopefully improving the overall agricultural sector. Although there are a variety of innovative indirect approaches, including supply chain management and inventory tracking tools, this paper focuses primarily on approaches that directly benefit rural end-users.

Mobile Agriculture Stakeholders

Mobile agriculture services rely on a variety of stakeholders across the public, private and nonprofit sectors. Understanding the perspectives of each stakeholder and building successful cross-sector partnerships is critical for developing a viable M4A platform. The following stakeholder analysis focuses on the *role, incentives and limitations* of each player in the mobile agriculture space.

Software/Application Developers

- **Role:** Software and application developers provide the *technical skills* to develop, implement and maintain mobile service platforms. These organizations can be either private sector or non-profit and can range from small start-ups to large international software developers.
- **Incentives:** Software and application developers tend to focus on *earning revenues* by selling their applications to end users, by selling subscriptions to their mobile platforms, or by providing their service for free and generating revenues through advertising or consulting services. Many application developers may also be motivated by creation social impact.
- **Limitations:** Software developers can often be *smaller in scale* than other mobile agriculture stakeholders, particularly MNOs, NGOs or international donors. They may also have a limited understanding of the needs of rural customers.
- **Examples:** Frontline SMS, Esoko



Mobile Agriculture Stakeholders Map

Mobile Network Operators (MNOs):

- **Role:** Mobile Network Operators provide the *technological infrastructure* necessary to host and distribute mobile services, and generally provide a large and growing customer base from which to draw mobile service

users/subscribers. MNOs can also contribute a recognized and trusted brand and can offer bulk data or message rates, to lower the cost of maintaining the mobile agriculture platform.

- **Incentives:** MNOs are generally interested in *increasing or maintaining their customer base*, increasing their Average Revenue Per User (ARPU), and developing additional revenue streams from their current stock of subscribers.
- **Limitations:** As with developers, MNOs may have a *limited understanding of the potential market size/customer preferences* in rural areas. They may also be constrained by regulations regarding mobile or electronic money or services, as well as by shareholder pressure for quick financial returns.
- **Examples:** Vodafone, Airtel

Agricultural Extension Workers:

- **Role:** Rural extension officers provide the *on-the-ground presence and local knowledge* necessary to develop appropriate and relevant mobile agriculture services as well as long-standing relationships with rural communities. Extension workers may be part of local government ministries or other agricultural research institutions, including universities or farmer field schools.
- **Incentives:** NGOs and extension officers tend to be focused on *improving the training/skills of rural farmers* and contributing to the overall development of rural communities.
- **Limitations:** NGOs and extension officers tend to be limited by *funding constraints*, as well as *limited technical expertise* in mobile platforms.
- **Examples:** CRS, TechnoServe, Farmer Field Schools

International Donors:

- **Role:** International donors can play a very specific role in supporting the successful development of mobile solutions by providing *initial financing or targeted financial support*. Because donor projects are designed to be short-term they are best used to target specific obstacles and challenges during the initial phases of mobile service development.
- **Incentives:** Donors tend to be focused on generating *demonstrated and sustained impact* through targeted interventions/programs.
- **Limitations:** Donors are limited both by the *amounts of available funding*, as well as by their overall strategic development objectives and commitments. Donors

are often also constrained by their limited interaction with private sector actors, and by the broad differences between private and non-profit organizations.

- **Examples:** USAID, World Bank

Mobile End Users:

- **Role:** As the final users/subscribers to the mobile service, the end users are the *ultimate determinant of the success of a mobile agriculture system*. End users can also play an important role both in the *initial development/testing* of the agricultural platform as well as the eventual growth and hopeful widespread adoption of the system.
- **Incentives:** Rural mobile users are motivated by the *perceived value of the mobile system*, as well as by the *ultimate benefits* from using the platform, in terms of increased market access, improved price transparency, higher crop yields or lower crop loss.
- **Limitations:** Rural customers tend to be limited by *low levels of literacy, technological experience and lack of information* on the potential benefits of mobile agricultural systems, as well as limited access to funds/savings.
- **Examples:** Rural farmers, farmer cooperatives

Local Businesses:

- **Role:** Local businesses and agriculture retailers provide important *physical distribution channels* among rural communities, as well as potential financial support in the form of *advertising or market research revenues*.
- **Incentives:** Local retailers/purchasers are interested in *expanding their links to rural markets and increasing their customer or aggregation base*. Input providers are motivated by increased sales of their products and by reducing their customer access costs.
- **Limitations:** Local purchasers and retailers tend to have *limited experience with mobile technologies* and may have *limited experience working with public or non-profit partners*.
- **Examples:** Rural produce purchasers/processers, agriculture input suppliers, transportation/logistics companies, emerging market retailers

Mobile Agriculture Technologies

In addition to the wide range of actors and stakeholders, mobile agriculture systems can employ a wide variety of types of technologies and services, including voice, SMS, voice-to-text, beeping (calling and hanging up before the call is answered), mobile internet access, etc. Each type of technology has its own set of benefits and drawbacks, including availability, cost, information capacity/type and ease-of-use. Understanding the benefits and drawbacks of each specific technology is critical for understanding the potential of various mobile-enabled agriculture approaches.[4]

The following analysis explores the five most common mobile technologies currently being used in mobile agriculture projects and weighs the benefits and drawbacks of each, and recommendations for use. To date, most successful mobile agriculture platforms remain focused on simple, common technologies, including voice and SMS.

Voice:

- **Description:** Basic voice calling, available on basic phones.
- **Benefits:** Greatly reduces literacy and ease-of-use barriers, often cheaper for end-users than per-SMS fees.
- **Drawbacks:** High cost of operation due to need for live operators, difficult to integrate with computer-base database.
- **Recommended Uses:** Good for customer feedback channels, helps overcome trust barrier with new users and communities. Best when used in combination with SMS or smartphone information distribution system.

SMS – Short Message Service:

- **Description:** Text-base message service, available on basic phones
- **Benefits:** Easy to use and relatively common. Enables one-to-many communication as well as integration with computer-based database.
- **Drawbacks:** High cost per SMS, limited to 160 characters.
- **Recommended Uses:** Good for direct-to-end-user platforms and large-volume limited information transfer. Less useful for agricultural extension services or teaching due to limited data capacity. Most effective as reminder/alert system or in combination with face-to-face extension or voice services.

[4] Hellström, 2010

USSD – Unstructured Supplementary Service Data:

- **Description:** Common mobile data protocol that enables simple text-based commands between handset and computer database
- **Benefits:** No fees associated with use, easy integration with computer back-end system. Enables simple search/information commands.
- **Drawbacks:** Input commands difficult to remember. Less familiar than SMS.
- **Recommended Uses:** Good for basic commands/queries if paired with sufficient training and in-person support. Dependent on robust computer database to support USSD commands.

Voice-to-Text/Text-to-Voice:

- **Description:** Applications that convert voice commands/information to SMS
- **Benefits:** Reduces literacy barrier, allows voice access to computer databases.
- **Drawbacks:** High programming/translation costs, challenging to use.
- **Recommended Uses:** Potentially beneficial in areas of low literacy, but reliant on strong technical capacity or revenue opportunities to overcome initial cost.

Smartphone-Enabled Data Services:

- **Description:** Smartphones allow for a wider variety of data capture, including photo, video, internet access and GPS data collection.
- **Benefits:** By utilizing data transfer, smartphone data costs are considerably cheaper than SMS or voice technologies. Enable richer data to be transferred.
- **Drawbacks:** Dependent on smartphones, high cost of handset.
- **Recommended Uses:** Most effective with intermediary/extension officer model of access as reduces cost of handsets and training.

Despite the wide variety of potential technologies available for use in mobile agriculture platforms, the vast majority of successful mobile agriculture platforms remain build on simple, easy-to-use and commonly available technologies. Basic SMS and voice technologies often provide the easiest access and lowest barriers to entry for direct end-users. Given the particular benefits and drawbacks of each type of technology, many mobile agriculture platforms have begun experimenting with multi-channel models of distribution/access, including combinations of mobile, radio and video technologies.

Mobile Agriculture Services

Mobile-enabled agriculture systems encompass a huge variety of interventions, products and services. There have already been a wide range of typologies developed to try to structure and organize the various types of service provided by mobile agriculture systems. The following section outlines two common typologies currently being used, focusing on an outline of mobile agriculture services based goal and on location on the agricultural value chain.

Mobile Services by Goal

One of the more common mobile typologies currently being used by international organizations was developed by Kerry McNamara as part of the Swedish International Development Agency (SIDA) report on mobile agriculture. This typology focuses on the ultimate *benefits* of the particular mobile service or platform and breaks the various approaches into four main categories: Education and Awareness, Commodity Prices and Market Information, Data Collection, and Pest and Disease Warning.

Goal-Based Typology of Mobile Agriculture Services

GOAL	METHOD
Education and Awareness	Information provided via mobile phones to farmers and extension agents about best practices, crop varieties and pest management.
Commodity Prices and Market Information	Prices in regional markets to inform decision making throughout entire agricultural process.
Data Collection	Applications that collect data from large geographic regions.
Pest and Disease Outbreak Warning	Send and receive data/warnings on outbreaks.

Source: Hellström, 2010

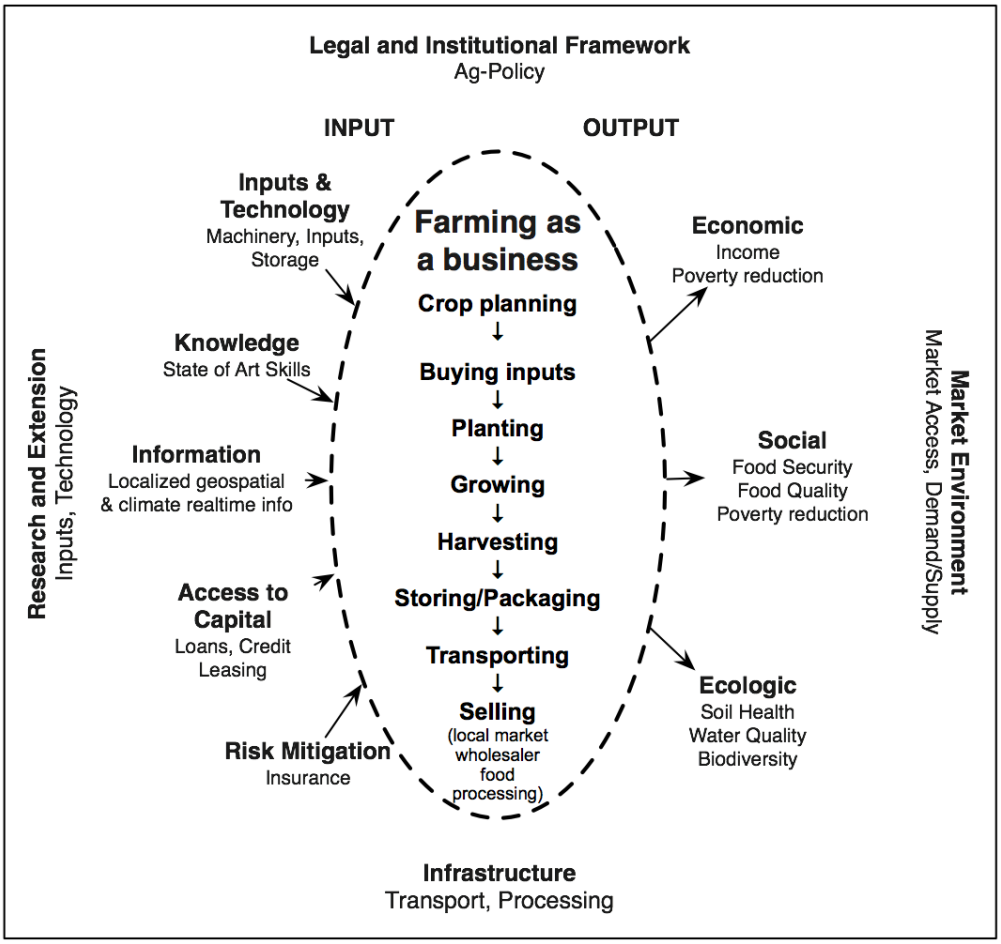
This typographical approach has several benefits. First, it allows an evaluator to quickly link proposed or existing mobile agricultural platforms directly to the established goals or objectives of a particular development program. Second, it forces mobile agricultural

providers to focus more clearly on the proposed outcomes and ultimate benefits or their product, rather than the basic services. This approach is less effective, however, when attempting to categorize services that provide multiple benefits. This model is also somewhat weakened by the fact that it focuses on a pre-determined goal for each mobile platform rather than focusing on user needs.

Mobile Services by Agricultural Value Chain

Another common way to understand mobile agriculture approaches is to examine it in the context of the agricultural value chain. There have been a number of typologies developed around this approach, the most comprehensive of which was developed by Fritz Brugger of the Syngenta Foundation.

Complex Value Chain-Based Typology of Mobile Agriculture Services

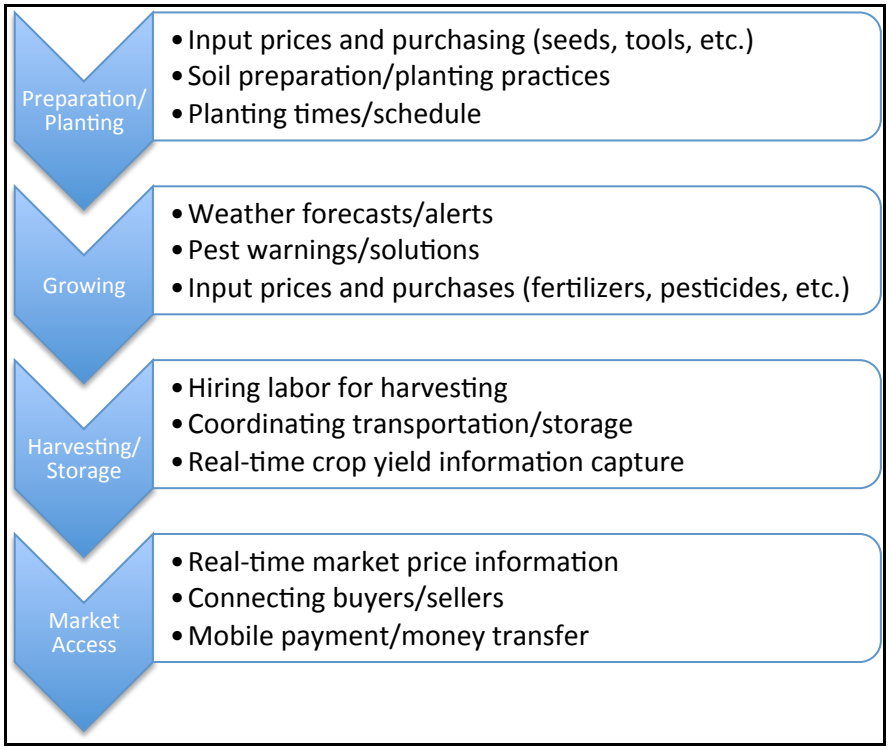


Source: Brugger, 2011

Under Brugger's typology the agricultural value chain is broken down into eight stages: crop planning, buying inputs, planting, growing, harvesting, storing/packaging, transporting and selling. Each stage must also be understood as a combination of inputs (including technology, knowledge, information, capital and risk mitigation) and outputs (including economic, social and ecological impacts). Finally, the entire value chain must be examined in the context of four enabling pillars: the legal and institutional framework, the market environment, the research and extension environment and the physical infrastructure.

Brugger's model is a powerful tool for understanding the full potential impact of mobile agriculture services, but its complexity makes it a challenging analytical tool. A simplified version of this model, shown below, focuses instead on four phases of production: preparation and planting, growing, harvesting/storage and market access. Existing or proposed mobile agriculture services can thus be easily categorized based on which phase of the agricultural production value chain they provide services for.

Simplified Value Chain-Based Typology of Mobile Agriculture Services



Developed by Author

Tying mobile agriculture services to particular points in the value chain allows for a closer focus on serving customer needs and identifying challenges/gaps at each particular stage of agricultural development. It also allows for a clearer development of partnerships based on stakeholders involved at each particular phase of agricultural production.

By Revenue Model

The final typological framework through which to gain a better understanding of mobile agriculture products is to focus on the particular revenue streams supporting various mobile platforms and services. Rather than focusing on the particular technology or goal of the mobile service, this framework breaks mobile platforms into four categories depending on their main source of revenue.

Revenue Model Typology of Mobile Agriculture Services

Revenue Model	Customer	Business Proposition
Fee-for-Service	Farmers, Farmer cooperatives	End-users pay direct for access to mobile information/services
Sponsorship	Agricultural purchasers, input providers, local retailers, research organizations, MNOs	Organizations pay fees for advertising, data collection, increased market access, new mobile subscribers
Subsidy	International Donors, local governments	Public organizations subsidize particular costs to develop public goods
Franchise/Consulting	NGOs, agricultural purchasers, research organizations	Basic technology/platform distributed open-source, consulting services offered for pay

Developed by author

Fee-For-Service

Many mobile agriculture platforms focus on a basic fee-for-service model, in which the final end user (generally the rural farmer) pays directly for access to the mobile service.

Fee-for-Service models can include both *pay-per-use* models, in which each particular exchange of information has a per-use fee, or *subscription* models, in which farmers pay a monthly or annual fee for unlimited access to the model. Tiered pricing structures have also been explored to tailor service fees to particular populations, particularly in base of pyramid communities.

Benefits/Drawbacks: Many fee-for-service models find it difficult to cover the full costs of operation through fee-for-service revenues, particularly in rural or impoverished agricultural regions. Working through existing community organizations, including farmer cooperatives or input supply channels can increase farmers' willingness to pay and provide clear and convenient payment channels.

Case Study Example: Reuters Market Light

Sponsorship

The sponsorship revenue model refers to mobile agriculture platforms that provide additional services to commercial or non-profit customers in order to finance or cross-subsidize their mobile platform. Under this model, organizations pay fees for advertising, data collection, survey completion, or increased customer access. Customers can include agricultural input providers, mobile network operators, agricultural research organizations or NGOs operating in the region.

Benefits/Drawbacks: Diversifying revenues through sponsorships can be a powerful way to increase operating revenues as well as start-up costs. Identifying potential customers can be difficult without the support of local stakeholders.

Case Study Example: eChoupal, IKSL

Subsidy

Nearly all mobile agricultural platforms surveyed relied on public sector funding or subsidies during their initial start-up and pilot phases. This support can take the form of start-up capital or funding for operations during the first year or two of project development. This support can also take the form of cost matching, with private sector stakeholders contributing the balance.

Benefits/Drawbacks: Providing full start-up funding can increase a mobile agriculture service provider's reliance on public sector funds going forward, and can decrease incentives for pursuing additional sources of revenues. Declining subsidies or funding for specific challenges/obstacles can ensure mobile providers remain focused on

developing sustainable revenue streams. International donors may also consider becoming involved as sponsors, paying for the development of public goods such as regional information or warning systems.

Case Study Example: Esoko, M-PESA

Franchise/Consulting

A number of mobile agricultural systems have begun exploring franchise and consulting models as ways to generate additional revenue. FrontlineSMS, a highly customizable SMS database, follows an open source consulting services model, in which the basic FrontlineSMS system is provided for free and consulting services offered to organizations wishing to make best use of the technology. Digital Green, a mobile video-based agricultural extension platform, offers free access to its database of agricultural videos and is developing a franchise model allowing expansion into several countries in Africa.

Benefits and Drawbacks: Franchising and consulting models offer an opportunity not only to diversify revenue streams, but also to increase the geographic coverage and potential impact of a particular mobile agriculture service. However there remains little data supporting whether or not these models can be financially sustainable.

Case Study Example: Frontline SMS, Digital Green

Conclusion

The mobile agriculture landscape consists of a huge number of stakeholders, technologies, services and revenue models, each with their own set of benefits and drawbacks. Developing a clear picture of the current players and approaches to mobile agriculture services is an important step in understanding the challenges and opportunities facing the mobile agriculture space.

Examining mobile agriculture systems in the context of these four lenses can provide a much clearer understanding of the types of mobile agriculture platforms already in operation and how proposed mobile agriculture systems fit into the broader mobile agriculture system.

Section II: Examining Mobile Agriculture Business Models

One of the biggest challenges facing mobile agriculture platforms to date has been the question of how to achieve financial sustainability. In order to reach widespread scale and long-term stability, mobile agriculture projects must achieve some financial independence away from international funding organizations or charitable donations.

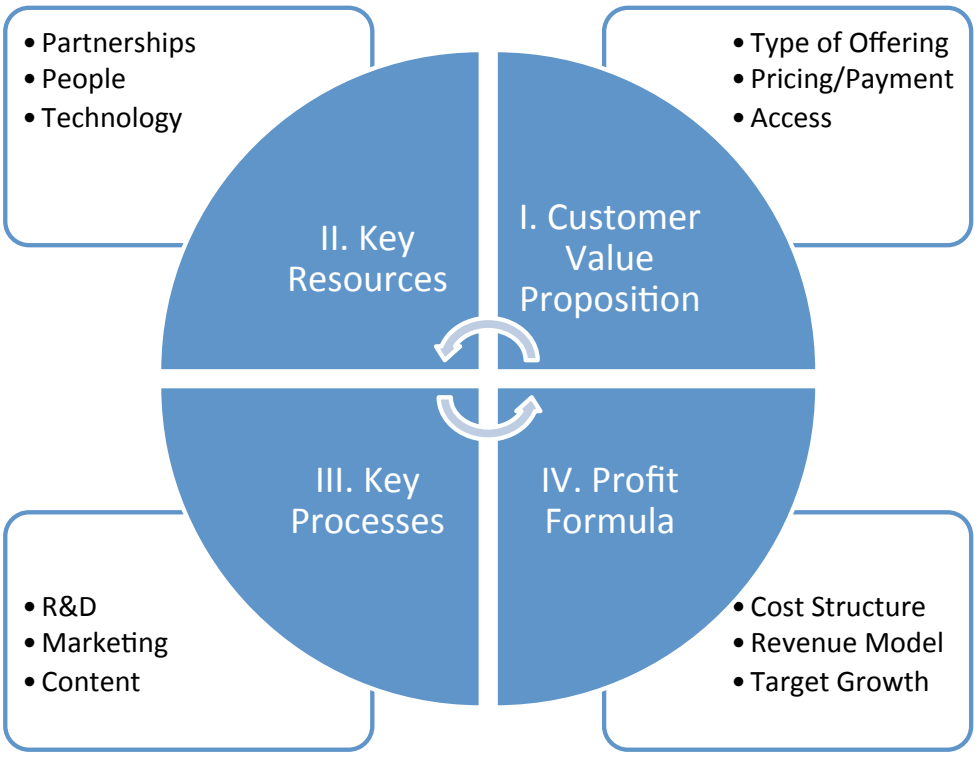
In order to develop this long-term financial sustainability, mobile agriculture projects must be supported by robust and coherent business models. To this end, it is useful to have a basic roadmap of the key components of a mobile agriculture business model. At the heard of the business model approach is the idea of viewing the end user as a customer of the service rather than a beneficiary. The role of the mobile agriculture projects thus becomes one of identifying gaps and creating value for those customers.

Although the details of each specific model will differ based on location, type of service, technology and specific partnerships, there are four key elements that nearly all business models should include. Using the basic business model framework developed by Professor Clay Christiansen at the Harvard Business School we can identify these basic elements as the following:

- I. A clear and compelling **Customer Value Proposition**;
- II. An understanding of the **Key Resources**;
- III. A framework to support **Key Processes**;
- IV. A basic **Profit Formula** designed to cover costs based on revenue streams

The graphic on the following page illustrates the four major elements, and twelve component parts of a mobile agriculture business model. Exploring each component briefly highlights some general recommendations and best practices that developing mobile agriculture models can follow to increase their chances of achieving financial self-sufficiency. When examined as a whole, these twelve components also provide a quick, yet robust assessment framework through which to evaluate the potential financial sustainability of developing mobile agriculture models.

Elements of a Robust Mobile Agriculture Business Model



Adapted from Eyring 2011

I. Customer Value Proposition

The heart of a robust business model is the initial Customer Value Proposition (CVP). Under traditional approaches to international development, projects begin by focusing on the type of outcome or impact they hope to have on a particular area or population. Under a business model approach, however, an organization must first identify a problem facing its targeted end users and then develop an offering that solves that problem more effectively, easily or affordably than the alternatives. The most successful mobile agriculture services and platforms provide clear and compelling value propositions to their customers, delivering **significant benefits** at an **affordable price** through **convenient channels**.

Type of Offering

In the case of agriculture, the targeted problem can be at any point in the agricultural value chain, including the initial lack of information about seeds or agriculture, limited or late warning on rainfall or pests, lack of ability to coordinate labor during harvest season, or lack of market transparency or accurate price data. For more information on the types of mobile agriculture offerings possible please see Section I.

Developing a Value Proposition
Matthew Eyring, Mark Johnson and Hari Nair have identified four steps to uncovering unmet needs in emerging markets and developing an offering that addresses those gaps:

1: Study what your customers are doing
2: Look for alternatives to your offerings that customers buy/use
3: Watch for compensating behavior
4: Search for explanations

Source: *New Business Models in Emerging Markets, HBR 2011*

Pricing

Once a specific type of service or product offering has been identified, the next key component to developing a sustainable mobile agriculture solution is focusing on affordability in the pricing structure. Customers in the base of the pyramid are extremely price sensitive. Rather that attempting to provide a full spectrum set of solutions or services at a higher cost, a robust business model should focus on the primary, less-expensive features offered a price customers can afford.

Access

One of the key benefits of mobile platforms is that they can do a lot of overcome the "last mile" challenge of reaching emerging market services. But mobile agriculture platforms often overlook the challenge of reaching their initial customer base. Because populations in emerging markets tend to be more geographically disbursed and more difficult to access, leveraging existing retail and market channels and developing easy mobile payment systems is a key step in enabling customer access.

II. Key Resources:

Once a mobile agriculture project has identified a clear and compelling value proposition, the next step is to organize the key resources necessary to deliver that service or product. In the case of mobile agriculture, this often means building *cross-sector partnerships* with local stakeholders in the public, private and non-profit communities. This also requires selecting the *most appropriate technology* through which to deliver the service, and ensuring the project has the *necessary human resources* to develop and maintain the mobile system.

■ Partnerships

Cross-sector partnerships are a critical element of nearly all successful mobile partnerships. As the Stakeholder Analysis in Section I showed, each potential actor in a mobile agriculture partnership brings a unique set of skills, expertise and incentives to the table. By combining the skills and interests of various sets of partners mobile agriculture projects are able to increase their knowledge of their customers' needs, decrease their costs of operation and improve their ability to generate revenues from multiple parties.

Choosing the Right Partners
Although every mobile platform examined by this report was the result of a partnership between public, private and non-profit organizations, some respondents mentioned the difficulties inherent in bridging the "culture" gap between sectors. Interview responses included the need to "be critical in selecting potential partners", particularly in the initial stages of a project, and the importance of "build[ing] partnerships based on shared benefits".

■ Technology

The second major resource a mobile agriculture project needs to address is the selection of an appropriate mobile technology on which to build its mobile agriculture platform. The type of technology selected may depend on a combination of the following: a) the technical infrastructure available in the particular country or region, b) the technological savvy of the communities targeted by the platform, c) the relative cost of using the technology versus alternatives, and d) the specific type of content and information being collected or distributed.

- People

Finally, mobile agriculture projects must ensure that they have the internal people and human capital necessary to develop, revise, operate and scale the mobile service or product being offered. Many attempted mobile platforms encounter significant challenges in hiring sufficiently educated or trained employees to develop and run their software.

III. Key Processes

Once a mobile agriculture project has identified and developed its value proposition, and organized the resources necessary to create and deliver that service or product, the next step in creating a robust business plan is to ensure that several key processes have been included to ensure the successful operation and navigation of the platform through the various phases of project development.

- Research & Development

Developing an easy-to-use, reliable and compelling mobile-based service or product is not an easy task and often requires substantial time for market research, product testing, project piloting and platform revisions. Many of the most successful mobile platforms profiled spent at least one year in the pilot phase, and many went through multiple iterations of their model before achieving results. Mobile agriculture platforms should build R&D into their business models from the outset, not only in terms of allowing for a pilot phase, but also in terms of developing ongoing customer feedback mechanisms such as call-in lines or two-way communication channels.

- Marketing

Rural farmers in emerging markets tend to be highly disbursed and difficult to access, making initial customer access a common challenge. Even mobile services built on recognized brands and well-established companies often require significant marketing campaigns to generate the initial critical mass of customers. Other marketing approaches that have achieved success have included working through existing retail and marketing channels, identifying community intermediaries through which to access farmers, and structuring incentives for word-of-mouth or viral marketing (including reduced fees for registered users).

- Monitoring & Evaluation

Finally, successful mobile agriculture services have the potential to deliver significant public and social benefit while simultaneously generating financial revenues and sustainability. But unless mobile agriculture projects invest in monitoring and evaluation mechanisms, the actual social impact of the platform may be overlooked. Unfortunately, for many mobile agriculture platforms a robust M&E system is at best an afterthought, if it is included at all. International funders such as USAID and major foundations and humanitarian organizations have a potential role in supporting the developing and inclusion of M&E frameworks into mobile agriculture projects.

IV. A Profit Formula

In order to actually achieve long-term financial sustainability, mobile agriculture platforms must develop a reasonable and attainable cost and revenue structure. Mobile projects should recognize that specific costs and revenues will change depending on the phase of the project and take into account initial start-up costs, cost of generating and maintaining online content and changes in clients and users willingness to pay. The profit formula must therefore be flexible enough to allow for future growth and scale of the platform, while managing that growth in a sustainable way.

- Cost Structure

The first step to building a reliable profit formula is to identify the initial and ongoing costs at each stage of a project, including the initial pilot or “proof of concept” phase, the full rollout phase and the later scale-up and widespread adoption phase. Developing the right partnerships, technologies and internal processes can do a lot to reduce up-front and ongoing costs, particularly in customer acquisition, content generation and operation and maintenance.

- Revenue Structure

One of the most challenging aspects of designing and evaluating a mobile agriculture platform is the actual revenue structure. Nearly all mobile agriculture platforms developed in emerging markets have been the result of an initial investment by a public

donor (including USAID or a large foundation or humanitarian donor) and/or a large private sector actor such as an MNO or agribusiness company. While these initial investments are critical for the initial platform creation and roll-out, developing reliable ongoing revenue streams remains a challenge for nearly all mobile agriculture platforms.

Of the mobile agriculture platforms profiled in this report, the most successful have covered costs through a combination of fee-for-use and subscription/service revenues. With the exception of M-PESA, most mobile platforms find that user fees are not sufficient to achieve financial sustainability but that a combination of revenue streams from end users and partner clients is necessary. Most successful revenue models use mobile money as a means of payment, particularly for end-users. Several innovative models have begun exploring franchise and consulting revenue approaches, with unclear results.

- Target Growth

The final component of a strong mobile agriculture business plan is a well developed growth plan to ensure adequate resources are set aside to expand and maintain the systems user base and to manage the increased operational and information-generating needs. Several mobile systems reviewed in the case studies developed their intial growth plan in partnership with MNOs or agriultural input/aggregation organizations, buildng up on their existing customer base.

Conclusion

Understanding and evaluating the potential sustainability of any mobile agriculture platform must begin with an assessment its business model. Robust business models should contain four key sections: *Customer Value Proposition*, the *Key Resources*, the *Key Processes* and the *Revenue Model*, each of which can examined based on the specific context and needs the mobile platform is attempting to address. Understanding the specific needs of the target users, the partners involved, the technical operations and the cost and revenue structure is essential for achieving financial sustainability. A two-page evaluative questionnaire based on this framework has been included in Appendix D.

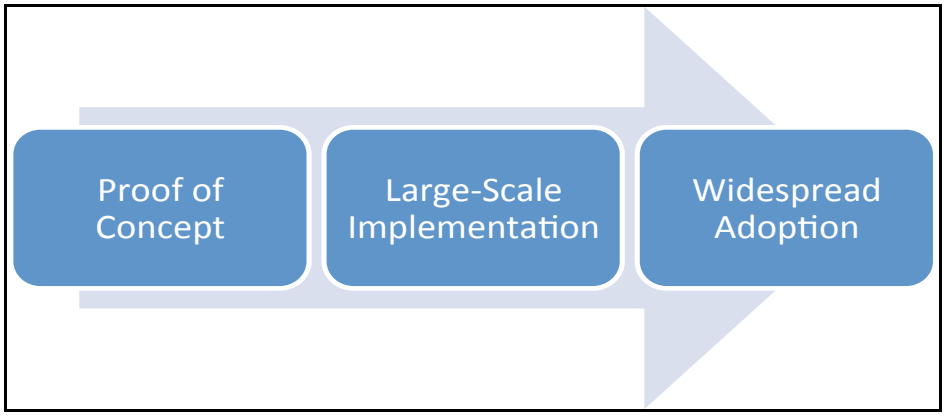
Section III: Challenges to Achieving Sustainability and Scale

Having explored the variety of technologies, services and business models being developed by mobile agriculture projects, as well as the critical elements of mobile agriculture business models, we can now turn to an exploration of the major challenges that prevent mobile agriculture solutions from achieving sustainability and scale.

To answer this question, the author conducted a series of interviews with industry experts, practitioners and researchers, each of whom have significant experience working with mobile agriculture platforms and services in emerging markets. Interviewees ranged from academic researchers to mobile platform developers to mobile network operators and private sector partners. A full list of interviews conducted for this research project can be found in Appendix C.

As expected, a wide range of challenges and obstacles came out in the interview process. The specific challenges tended to vary based on the stage of project development. As a result, the following obstacles have been grouped according to the following three major phases of project development and sustainability, developed by USAID's Development Innovation Ventures (DIV) office.

Three Stages of International Program Development



Source: SAID DIV Framework

Stage 1: Proof of Concept

The vast majority of mobile agriculture projects never advance past the first stage of development, the Proof of Concept stage. Under this stage, innovative approaches to mobile agriculture are tested in limited pilot projects, and revised based on user feedback or impact assessments. The biggest obstacles at this stage of project development revolve around the first two components of the mobile agriculture business model: developing a clear and compelling Value Proposition and organizing the Key Resources necessary to deliver that service or product.

Trying to Do Too Much

One of the biggest challenges mobile agriculture solutions run into is simply trying to do too much at once. As Section I highlights, there are a huge range of types of mobile technologies and platforms, and a wide range of information and services that can be provided at each stage of the agricultural value chain. Each additional service or platform increases the cost of running the platform, the relevant expertise needed to generate and deliver content and the sources of information needed to maintain the service.

Example: M-PESA
Launched in early 2007 by Vodafone affiliate Safaricom, M-PESA was the first mobile money transfer platform to reach significant success and scale. M-PESA benefitted from a very clear initial value proposition, "Send Money Home", backed up by a simple and reliable user interface. Only after M-PESA's core money-transfer feature became widely used did the platform expand into additional services. With an estimated 6 million users M-PESA remains by far the most successful and broadest-reaching mobile service targeting customers in emerging markets.

Recommendation: Mobile agriculture platforms that focus on one clear and compelling value or service in their initial stages are more likely to be able to deliver on that proposition. Customers in emerging markets expect reliable and consistent service in order to continue using new services, which can be challenging when attempting to maintain multiple services or products. The clearer the initial Value Proposition is, the easier it is to communicate to potential customers.

- Lack of Attention to Barriers to Adoption

Barriers to adoption tend to include both technical barriers as well as substitute products and services. Under the first group, literacy and language constraints can be major barriers, as well as the basic technological capacity of users. Technologies that attempt to overcome these barriers, including voice-to-text technology, can often drive up the cost of operation due to the need to digitize/translate content. In terms of substitute products, understanding traditional or currently existing sources of information and services is critical for understanding the farmer's willingness to adopt or potentially pay for a new technology.

Example: Ghana Export Promotion Council
Developed by the national agency Ghana Export Promotion Council, GEPC attempted to support access to mobile technology in remote areas in order to increase yield and improve marketing systems. Built on SMS platform, but limited by poor reception in target areas, messages were not received. Farmers eventually abandoned the system and went back to using basic voice calls to coordinate.

Recommendation: Mobile agriculture platforms that pair technological services with in-person support and training are better able to overcome barriers to adoption than services that rely entirely on mobile communication. Even more robust are platforms that deliver agricultural information and services through local extension agents, which can both reduce operational cost and reduce trust and technological barriers to adoption.

- Lack of User Buy-In/Ownership

Developing a mobile service that actually addresses the needs of the targeted population requires extensive beta-testing and user feedback. Generating significant user buy-in on the structure, value and actual operation and management of a mobile platform can contribute not only to the initial uptake of the service, but also to the long-term local ownership of the model.

Example: DatAgro
Developed in 2009 by the US nonprofit organization DataDyne and piloted in the Cachapoal Valley of Chile, the Mobile Information Project organizes internet information into easily transmittable news feeds based on the Real Simple Syndication (RSS) platform, then delivers that information to targeted farmers through SMS messages. After one year, farmer cooperatives saw the benefit of being able to easily and send messages to their farmers and eventually took over costs and overall management of system.

Recommendation: Demonstrating the value of a system to farmer cooperatives or other local stakeholders can help ensure long-term ownership of the system or model and ongoing cost/management support.

Stage 2: Large-Scale Implementation

Once a mobile service has been introduced and tested at a small, pilot scale, the next stage of project development is to release the product at a larger-scale. Many of the mobile platforms reviewed below encountered challenges in building an adequate user base and scaling up their operations without building strong multi-sector partnerships, leveraging existing market structures and using trusted sources of information.

- Failure to Leverage Multi-Sector Partnerships

As mentioned in Section II, developing appropriate multi-sector partnerships is a critical component of a robust business model for mobile agriculture projects. Unfortunately, many mobile platforms are developed as stand-alone platforms linked to specific development projects or initiatives. Even when spun off at the end of the project lifespan, these types of mobile platforms are rarely successful without the support of public/private/non-profit partnerships.

Example: IKSL
Developed by subsidiary of Indian Farmers Fertilizer Cooperative (IFFCO) and Bharti Airtel, India's leading MNO, IKSL provides mobile agricultural information and services to rural farmers. IKSL was born out of a public/private partnership, allowing Airtel to expand their customer base and IFFCO to provide better services to their farmers. Cost of generating content was borne by Airtel in exchange for expanded subscriber base and airtime use. $500,000 start-up grant provided by Gates Foundation. IKSL paid by Airtel for each new customer and based on customer talk time.

Recommendation: Building multi-sector partnerships in the initial stages of a mobile platform development can lead to significant cost savings in the initial start-up and widespread adoption phases. When paired with intial start-up funding by non-profit or public sector partner can lead to development of financial sustainable services.

- Lack of Attention to Trust Deficit

One of the biggest challenges that mobile agricultural services face in building or maintaining their customer base is their failure to address the trust barrier facing new sources of information or advice. Many mobile agriculture platforms assume that the market data or planting advice that they provide will automatically be accepted by farmers as trustworthy. In fact, given their lack of support systems or safety nets, farmers can be very hesitant to trust a new source of information, and quick to abandon a source if it proves unreliable.

Example: eChoupal
Developed in 2000 by the Agribusiness division of ITC Ltd., a large consumer goods company in India, eChoupal provides a transparent purchasing channel, product supply and agricultural information channel operated by trusted farmer families. Utilizing farmer families allows eChoupal to attract users through word-of-mouth and eliminates the need for widespread end-user training on how to use the mobile information system.

Recommendation: In order to address this trust barrier, some mobile agriculture services have tried working with locally-accepted sources of information, including local newspapers, government price indices or local farmer cooperatives. In addition to bringing down the cost of maintaining or developing content, this also allows the mobile platform to benefit from the pre-existing relationship and trust between the farmer and the source of information.

- Failure to Build on Existing Structures

Mobile agriculture platforms do not exist in a vacuum, but are part of the larger agriculture value and supply chain. Mobile agricultural platforms that fail to leverage existing market structures, including input distributors, agricultural purchasers and farmer cooperatives, often find themselves constrained by the high cost of generating usable content, maintaining the operations and expanding to new customers.

Example: Reuters Market Light
Started by multinational company Thomson Reuters, Reuters Market Light (RML) serves nearly 200,000 farmers with customized and localized weather forecasts, crop prices, agricultural news and information via SMS. Built on Reuter's private content generation system, but had difficulty developing tailored content until developed parternships with 2000 weather stations, universities and Indian Post Office to assist with content generation and information capture.

Recommendation: Platforms that harness existing extension services, distribution channels and community relationships see benefits in terms of customer access, retention and lower operating costs. Working with or through the existing input supply chain can greatly increase the impact and decrease the costs of maintaining a mobile agriculture service. By engaging with input distributors, mobile services can provide farmers with information on fertilizer, pesticides or tools and direct them to local sources of those materials. By working with agricultural purchasers the platform can link farmers to markets and improve price transparency and accountability between both groups.

Stage 3: Widespread Adoption

By far the most challenging stage of a developing mobile agriculture platform is the transition from large-scale implementation to widespread adoption. Of the dozens of mobile agriculture platforms studied in this report, only a few have reached user bases in the hundreds of thousands, and only M-PESA can boast a user base in the millions. Despite the lack of a significant data set for examination, the following recommendations have been drawn from interviews and industry survey reports.

Lack of Diversification of Revenue Streams

Most mobile agriculture projects tend to be supported by international donors in the initial pilot and adoption phase. Unfortunately, this approach often comes with its own set of challenges. First, farmers who receive a service or product for free during the first year or two of a subsidized project are far less willing to begin paying for the service through a fee-for-use structure. Second, focusing primarily on end-user fees prevents mobile agriculture providers from exploring additional revenue streams from other stakeholders, including agribusinesses, research organizations or local institutions.

Example: Vodafone
Vodafone has become one of the lead MNOs supporting the spread and development of mobile development services, including mobile money, m-health and mobile agriculture applications. Despite their support, their major concern with major investments in mobile technology in rural agricultural areas stems not from the initial capital outlay but rather the lack of information about potential customers and long-term revenues from those investments. Providing basic population, crop and market data can enable private sector stakeholders to conduct their own market sizing assessments and decide to participate in mobile agriculture projects.

Recommendation: Mobile agriculture projects should take care to identify potential revenue streams at the earliest stages of project development, including revenues from advertising, survey/research activity, franchising and improved customer access. Models based on fee-for-service should take care when offering the service for free during the initial stages of a project.

- Lack of Understanding of Private Sector Incentives/Concerns

Most mobile agriculture providers are motivated by a combination of social impact and future revenues. International donors and foundations are motivated by creating public good and social value. Private sector actors, however, can be motivated both by revenues as well as additional spillover effects of proposed mobile models. Developing a long-term sustainable mobile model is difficult without understanding the incentives and concerns of private sector stakeholders, including MNOs, agricultural input providers and commodity traders/purchasers.

Example: Grameen AppLab Community Knowledge Worker (CKW)
When the Community Knowledge Worker (CKW) program was first piloted in 2009, Grameen Foundation did not charge farmers any fee for agricultural information or extension services. The roughly $1 million in start-up costs was initially covered by a grant from the Gates Foundation. The project is currently attempting to transition to a revenue model based partly on user fees as well as data capture fees and franchising fees, but has found it difficult to transition current users to a fee-for-service model.

Recommendation: Building communication and data flows between multi-sector partners is critical for the long-term health of mobile service partnerships. Often the concerns or interests of some set of parties may be addressed through information held

by another set of partners. Developing a common understanding of the opportunities and potential challenges facing mobile agriculture efforts will strengthen the long-term viability of these partnerships.

- Lack of Sufficient Community Feedback

Most successful mobile agriculture platforms include significant community involvement into the early stages of product/service development, but many fail to continue to strengthen and develop this relationship. Building in a continuous user feedback loop can help mobile agriculture models achieve wider scale by helping them address and respond to changing user concerns and needs.

Recommendation: Mobile agriculture platforms depend on continuous user feedback to improve and revise their product and service offerings. Building clear feedback mechanisms into mobile agriculture models allows organizations to easily gather user data and improve their services. Allowing users to provide feedback and generate data can also lower the cost of content generation and enable additional revenue streams, including survey response and widespread data collection.

Conclusion

Mobile agriculture platforms face different sets of challenges and obstacles at each stage of project development, but many of these challenges can be easily addressed or avoided if planned for appropriately. Unfortunately, few mobile agriculture platforms have access to a common set of lessons learned, best practices or common pitfalls, which would better enable them to manage each stage of project development. Collecting lessons learned from a variety of successful and less-successful mobile agriculture projects can help bridge this informational gap and allow more mobile agriculture platforms to reach widespread scale and adoption. As an impartial observer, international donors such as USAID have the opportunity to collect and distribute such lessons learned and decrease the number of mobile platforms that hit major roadblocks to sustainability.

Each of the examples included above can be found in greater detail in the Annexes.

Section IV: The Potential Role of International Donors

Given the many obstacles faced by mobile agriculture platforms and pilot projects at each stage of project development, the final question becomes: what is the potential role of USAID and other international donors to support the development of sustainable mobile agriculture solutions?

The following recommendations have been drawn from a combination of stakeholder interviews surveys of mobile business and consulting reports and academic studies of the major challenges facing mobile and ICT4D. These recommendations have also been influenced by the "Collective Impact" model developed by John Kania and Mark Kramer at FSG. Under this approach, long-term multi-stakeholder social impact movements must take place at four levels: Governance and Infrastructure, Strategic Planning, Community Involvement and Evaluation and Improvement.

Operational Model for Collective Impact

	Phases of Collective Impact		
	Phase I	**Phase II**	**Phase III**
Components for Success	*Initiate Action*	*Organize for Impact*	*Sustain Action and Impact*
Governance and Infrastructure	Identify champions and form cross-sector groups	Create infrastructure (backbone and processes)	Facilitate and refine
Strategic Planning	Map the landscape and use data to make case	Create common agenda (goals and strategy)	Support implementation (alignment to goals and strategies
Community Involvement	Facilitate community outreach	Engage community and build public will	Continue engagement and conduct advocacy
Evaluation and Improvement	Analyze baseline date to identify key issues and gaps	Establish shared metrics (indicators, measurement and approach)	Collect, track and report proress (process to learn and improve)
Adapted from *Channeling Impact: Making Collective Impact Work, HBR*			

Using the four components of Collective Impact as an organizational structure, the various recommendations and gaps identified through the interviews can be mapped out into a multi-stage, multi-level strategic framework. The following section briefly

outlines twelve concrete steps international donors such as USAID can take to facilitate the creation of an enabling environment, within which sustainable mobile agriculture projects are more likely to develop and thrive.

Stage 1: Support An Enabling Environment

USAID's support in the first phase of project development should be focused on creating a facilitating environment within which actors from the public, private and non-profit sector can collaborate to create innovative approaches to providing mobile-enabled agricultural solutions to rural communities. Rather than attempting to "pick the winners", the focus should be on lowering the barriers to entry for new actors and models.

1. **Governance and Infrastructure:** *Support Multi-Sector Partnerships*

As a large-scale donor and multinational actor, USAID has the unique potential to support the creation of multi-sector working groups and partnerships across geographic location. This partnership creation can be facilitated through USAID's formal channels, such as through the development of an online collaborative platform or the creation of a global listing of organizations or stakeholders involved or interested in mobile approaches to development. Partnerships can also be supported through informal channels, including encouraging partnerships or linkages between institutions, non-profits and private-sector actors in particular countries or geographic regions.

2. **Strategic Planning:** *Map the mobile agriculture landscape*

In addition to supporting the initial creation of partnerships, USAID can play an important role in developing and distributing initial data on the overall landscape of mobile agriculture opportunities and gaps. USAID's presence in so many countries enables it to see broad trends of agricultural needs and deficiencies. In addition, USAID's partnerships with local governments and implementing organizations often generate significant local market information, including numbers of farmers, crop varieties and historical harvest data and infrastructure assessments. This data could be provided on a more consistent basis to mobile agricultural service providers as well as potential private partners to enable them to best target mobile services based on customer needs and service delivery gaps.

3. **Community Involvement:** *Support local mobile innovation challenges*

One major role that USAID plays in supporting mobile agriculture platforms is funding or subsidizing the initial start-up of innovative mobile platforms. This funding has traditionally been distributed through existing development projects, forcing implementing partners to attempt to identify robust mobile approaches on their own. As an alternate approach, USAID should consider funding local or regional innovation challenges, in which organizations or consortium participate in a competitive process to develop or design the most innovative approaches to mobile agriculture. Similar approaches have been taken through USAID's Grand Challenges, designed to encourage and facilitate entrepreneurial approaches to development challenges rather than a "pick the winners" approach.

4. **Evaluation and Improvement:** *Develop technical "how to" toolkits*

A final role USAID can play in supporting the development of a facilitating environment for mobile agriculture is to develop initial baseline data and technical toolkits to lower the barriers to entry for mobile approaches. Baseline data and toolkits addressing the basic phases of agricultural production, challenges and solutions for common crops in various regions and agricultural extension information regarding planting, pest management or harvest techniques can help bridge the gap between agricultural expertise and technical expertise. Once developed, these toolkits can be housed and distributed as open source resources, available to any potential mobile or agricultural service provider.

Stage 2: Organize for Impact

In the second stage of sustainable mobile agriculture project development USAID's focus should be on facilitating the creation of a robust evaluative framework through which to assess the performance of mobile agriculture models. By organizing a common set of metrics and M&E approaches, USAID can help ensure that mobile agriculture approaches incorporate both financial sustainability as well as social impact indicators into their internal assessment frameworks, and that best practices and lessons learned are collected and distributed.

1. **Governance and Infrastructure:** *Support for Monitoring and Evaluation*

One critical aspect of the implementation and testing phase of mobile agriculture systems that is often overlooked is the inclusion of a robust monitoring and evaluation system. Mobile solutions providers are often preoccupied with basic operational challenges, or have limited funds to devote to M&E systems. By providing financial and technical support to mobile agriculture platforms, USAID can contribute to the development of more robust and data-driven approaches to mobile services.

2. **Strategic Planning:** *Create Common Agenda/Goals*

Similarly, USAID can play an important role in setting the common agenda for mobile agricultural services in general. As in the example of the Grand Challenges, this can be done by drawing attention to the broader development goals and strategies that mobile agriculture platforms can feed into, and by outlining the major development agenda that should guide mobile agriculture approaches.

3. **Community Involvement:** *Facilitate local community engagement*

Another major challenge that mobile agriculture services encounter when rolling out new services or products is the challenge of building trust with local communities and organizations. USAID and its implementing partners can do a lot to facilitate engagement with local communities and to legitimize mobile platforms, either through distributing information on mobile agriculture technologies or by encouraging direct engagement with local organizations, government ministries or research institutions.

4. **Evaluation and Improvement:** *Establish shared metrics for performance measurement*

One of the more technical roles international donors can play in supporting the organization of mobile agriculture development is by taking a role in establishing specific performance indicators and metrics with which to assess mobile agriculture services. Developing a common set of metrics and measurements is valuable not only in assessing the performance and impact of specific mobile agriculture approaches, but also in developing a common language and set of expectations among mobile agriculture stakeholders.

Stage 3: Facilitate Mobile Access

USAID's role in supporting the final stage of successful mobile agriculture service development should focus on lowering the infrastructure barriers to mobile access in remote and rural areas, supporting the continued evolution and innovation of mobile agriculture models and increasing the ability of local communities and regions to develop their own mobile solutions. By focusing on expanding the potential reach and capacity of local communities, international can support the transition of successful mobile services from large scale projects to truly widespread services.

1. **Governance and Infrastructure:** *Support "Last Mile" Mobile Connectivity*

Despite the rapid growth of mobile connectivity in the developing world, the vast majority of mobile connections remain concentrated in urban and peri-urban areas. Without the continued spread of reliable and serviceable mobile coverage many mobile agriculture platforms will be unable to reach isolated rural communities. By supporting MNOs and national governments to invest in the continued development of last-mile phone towers in rural agricultural areas, USAID can help to expand the potential reach and reliability of mobile agricultural services. This support could take the form of direct cost-sharing, subsidization of development in particular areas or some other sort of support.

The Connectivity Challenge

A 2010 survey report conducted by Hystra highlighted five main barriers to mobile connectivity facing rural customers:

1. General telecommunications infrastructure (including network connectivity)
2. Last-mile antennas to reach rural and isolated communities
3. Affordability of handsets and mobile service rates
4. Availability of distribution network for handsets and SIM cards
5. Reliable sources of energy for infrastructure and end-user handsets

Of these five potential barriers, *last-mile antennas* remain the biggest challenge for rural customers, particularly in remote areas.

2. **Strategic Planning:** *Support Multi-Channel/Multi-Service Approaches*

Many of the most successful mobile platforms currently being used in the developing world have grown out of mobile money services (M-PESA being the most significant example) that have reached critical mass and begun adding additional types of services. USAID

can help to foster the development of these multi-service and multi-channel models by facilitating communication between companies operating various types of mobile channels.

3. **Community Involvement:** *Support Creation of Local Technology Training Centers*

One of the biggest constraints mobile agriculture platforms face when attempting to scale-up is simply the challenge of hiring staff with sufficient technical expertise to develop and maintain mobile software systems. One way USAID can help to develop those local skills is to support the development of local technology training and innovation centers. By working with local universities to expand their training programs and include technical skills and entrepreneurship USAID can help bridge this skills gap and set the foundation for a new generation of emerging technical entrepreneurs.

4. **Evaluation and Improvement:** *Collect and Distribute Lessons Learned*

Finally, USAID can play an enormous role in supporting the development and strengthening of mobile agriculture platforms simply by collecting, distributing and bringing attention to major lessons learned, best practices and success stories. Gathering examples of successful mobile agriculture platforms, and letting the rest of the world know about new developments and approaches, will help increase the level of innovation in the industry and hopefully lead to more success stories.

Conclusion

International donors have a unique role to play in supporting the creation of sustainable mobile agriculture approaches. Rather than attempting to “pick the winners”, donors such as USAID can play a critical role in developing an enabling environment within which mobile agriculture stakeholders can share information, develop innovative models and test a variety of approaches. By playing a role of facilitator, organizer and technical supporter, international donors can ensure that a variety of international and local actors have the tools they need to develop and test sustainable approaches to mobile agriculture, share and access information and measure their progress.

Summary and Next Steps

Despite the rapid spread of mobile connectivity throughout the developing world, the impact of mobile technologies on international development efforts remains unclear at best. Because the field of ICT4D and mobile for development remain in their infancy, there are few established practices or lessons learned that entrants to the community can draw from. Furthermore, because the approaches and technologies themselves are so new and change so quickly, simply gaining a clear picture of the opportunities and obstacles facing mobile development efforts can be itself a significant challenge.

This report attempts to provide a clear overview of the current state of mobile agriculture approaches, and in doing so to highlight the major features of mobile agriculture technologies and partnerships, the critical components of mobile business models, the most common challenges and obstacles mobile platforms face at various points in their development, and finally to outline the potential steps international donors can take to support the continued development and maturity of the mobile agriculture and broader mobile for development and ICT4D sectors.

The frameworks, lessons learned and recommendations contained in this report are meant to serve merely as a starting point for a more detailed and in-depth analysis of each component of mobile agriculture success. The cases explored in this report illustrate only a small portion of the many mobile development projects currently being developed and implemented, and the lessons learned and recommendations only scratch the surface of what remains to be done.

Throughout the process of researching this report, one thing became very clear: the need for increased communication and information exchange between the many stakeholders involved in developing mobile agriculture solutions. Going forward, it is hoped that USAID can continue to play a role in facilitating and organizing this communication, and that this report will help structure and organize that process.

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Appendix B: Glossary

Agri VAS	Agriculture Value Added Service
ARPU	Average Revenue Per User
CKW	Community Knowledge Worker
CRS	Catholic Relief Services
CVP	Customer Value Proposition
DIV	Development Innovation Ventures
GEPC	Ghana Export Promotion Council
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GSMA	Global System for Mobile Communications Association
HBR	Harvard Business Review
ICT	Information and Communication Technology
ICT4D	Information and Communication Technologies for Development
ITU	International Telecommunications Union
M4D	Mobile Phones/Communication Technology for Development
M4A	Mobile Phones/Communication Technology for Agriculture
M&E	Monitoring and Evaluation
MIP	Mobile Information Platform
MMS	Multimedia Messaging Service
MNO	Mobile Network Operator
M-PESA	Mobile-based money transfer service
NGO	Non-Governmental Organization
RML	Reuters Market Light
RSS	Real Simple Syndication
R&D	Research and Development
SIM	Subscriber Identity Module
SIDA	Swedish International Development Agency
SMS	Short Message Service
USAID	US Agency for International Development
USSD	Unstructured Supplementary Service Data
VoIP	Voice over Internet Protocol
WAP	Wireless Application Protocol

Appendix C: Interviews Conducted

Academics/NGOs	Implementers	Mobile Network Operators
• Josh Woodard, FHI 360 • Jenny Aker, Tufts • Calestous Juma, HKS • Shaun Ferris, CRS • Graham Dixie, World Bank • Amol Jhadav, mFarmer	• Mike Field, Dunavant • Brad Magrath, MTZL • Mark Davies, Esoko • John Zoltner, Datadyne • Sean McDonald, FrontlineSMS • Rikin Gandhi, DigitalGreen • Aleksandr Pavlovic, FreshConnect • *Katrin Verclas, MobileActive* • *Sean Krepp, Grameen AppLab*	• Fiona Smith, GSMA • Garren Bird, Vodafone • Sonal Banerjee, Airtel

Appendix D: Framework for Evaluating Mobile Agriculture Business Models

1. **Customer Value Proposition**
    I. Type of Offering
        a. Has the organization identified a clear and compelling need among it's targeted user base? Does the proposed service respond to that need?
        b. What are the current alternatives being used by target users? Does the proposed mobile agriculture solution offer sufficient additional value to attract users?
    II. Pricing
        a. Is the mobile service offered at an affordable price point for users? How does the price compare to substitute services?
        b. Does the proposed payment system build on existing partnerships (farmer cooperatives, input suppliers, etc)?
    III. Access
        a. Can the service be accessed through a basic mobile handset?
        b. Are there major literacy/linguistic barriers to using the mobile system? If so, how are these being addressed?

2. **Key Resources**
    I. Partnerships
        a. Does the mobile agriculture platform leverage partnerships between MNOs, NGOs, government and/or local institutions?
        b. Are the partnerships based on shared gains for all stakeholders?
    II. People
        a. Does the organization have experience developing mobile services in emerging markets?
        b. Does the organization have the technical capacity to maintain the required mobile platform/service?
    III. Technology
        a. Does the mobile service work on the currently existing technological infrastructure in the target region?
        b. Is the software/platform based on open standards?

3. **Key Processes**
    I. Research & Development
        a. Has the technology been beta tested among potential users for feedback on ease-of-use, design and reliability?
        b. Are mechanisms in place for continued feedback/input from users?
    II. Marketing
        a. Has the platform established an initial user base? If not, has the organization developed a plan to reach the initial critical user base?
        b. How will the service expand its intended user base?
    III. Content
        a. Does the service incorporate information or services from recognized and trusted sources (ie. government services, national newspapers, etc.)?
        b. Will end users be able to access direct, face-to-face technical support in case of problems using the mobile service?

4. **Profit Formula**
    I. Cost Structure
        a. Has the organization clearly identified the major costs of each phase of operations (pilot, scale-up, ongoing operation)?
        b. Has the organization leveraged existing organizations and structures (farmer cooperatives, input providers, market systems, etc.) to reduce costs?
    II. Revenue Model
        a. Are the costs of operating/maintaining/growing the mobile platform being covered by the organization's current or planned revenues?
        b. Has the organization diversified its revenue stream to provide value to multiple actors (MNOs, local governments, input providers, researchers, etc.)?
    III. Target Growth
        a. Does the platform have the technical capacity to add users and maintain a reliable level of service?
        b. Does the organization have a growth target/projection over the first 1-2 years? Does this growth seem feasible?

Adapted from FACET Briefing Paper, Software Platforms for Mobile Applications for Agricultural Development. October 2011.

Appendix E: Mobile Agriculture Typology by Service

Agriculture Solution	Platform/Service	Potential Outcome
Improving Access to Financial Services	Mobile Payment System	Increasing access and affordability of financial services tailored for agricultural purposes
	Micro-Insurance System	
	Micro-Lending Platform	
Provision of Agricultural Information	Mobile Information Platform	Delivering Information (agricultural techniques, commodity prices, weather forecasts)
	Farmer Helpline	
Improving Supply Chain Efficiency	Smart Logistics	Optimizing Supply Chain management across agriculture sector and improving transportation logistics
	Traceability and Tracking System	
	Mobile Management of Supplier Networks	
	Mobile Management of Distribution Networks	
Enhancing Access to Markets	Agricultural Trading Platform	Enhancing the link between commodity exchanges, traders, buyers and sellers of agricultural produce
	Agricultural Tendering Platform	
	Agricultural Bartering Platform	

Source: Connected Agriculture Report, Vodafone and Accenture, 2011

Appendix F: Common Mobile Technologies

Technology	Description	Availability	Benefits	Drawbacks
Voice	Basic voice calling	Basic phones	Avoids literacy barriers	High host of operation
Short Message Service (SMS)	Text-based messaging	Basic phones	Low cost of operation	Limited to 160 characters
Unstructured Supplementary Service Data (USSD)	GSM mobile data protocol	Basic Phones	Low cost, two-way communication	Limited to 182 characters
Voice-to-text/text-to-voice	Programs that convert voice to SMS	Basic phones	Reduced costs, avoids literacy barrier	Limited capacity, high programming cost
Interactive Voice Response	Computer programs that respond to voice input	Basic phones	Avoids literacy barriers	Potential linguistic barriers, high cost
Wireless Application Protocol (WAP)	Limited web access	Smart phones	Greater information capacity	Limited to smart phones
Multimedia Messaging Service (MMS)	Messaging with image/video	Smart phones	Higher information capacity	Higher per-use cost than SMS
Camera	Image/video capture	Smart phones	Greater ability to capture information	Limited availability
Bluetooth	Data transfer over short distances	Smart phones	Enables local networking	Limited range/capacity
Mobile Web	Full web access	Smart phones	Greatest information capacity	High cost of use, limited availability
Global Positioning System (GPS)	Location-based information	Smart phones	Ability to generate detailed user info	Limited availability

Case Study: Esoko

Location: Ghana **Created:** 2008 **User Base:** 26,000

Background: Developed by a private Ghanaian technology firm in 2006, and rebranded as Esoko in 2009. Underwent two heavy R&D phases during 2008 and 2010. Currently operational in Ghana and developing additional franchise countries.

Customer Value Proposition:

- *Type of Offering:* Mobile-enabled platform for farmers, agro-traders, businesses, NGOs and governments. Enables users to access real-time market information, receive price alerts, SMS commodity purchasing and data upload.
- *Pricing:* Free for first month (for end users) then sliding scale based on willingness/ability to pay, franchising fees and a share of revenues (for partners)
- *Access:* Works on basic phones, customers can subscribe via SMS or online

Key Resources:

- *Partnerships:* Partners include USAID, FAO, Technoserve, MTN, IFC, local agricultural traders and agribusinesses and local government ministries. *Technology:* SMS-based basic services (price queries, trades, searches, etc), smartphone-enabled advanced services, computer-based backend system.
- *People:* Over 20 full time local software engineers, 60 headquarters staff

Key Processes:

- *R&D:* Two years in R&D phase, usability continually tested with end-users.
- *Marketing:* Road shows to markets in Ghana, education by flyers on how to use service, field trainings for farmers/cooperatives, national marketing campaign.
- *M&E:* M&E platform being developed.

Cost/Revenue Model:

- *Cost Structure:* Approx. $1m USD to implement system in new country.
- *Revenue Structure:* Franchise model of growth, profitable with 6000 subscriptions and 1000-2000 supporting businesses (estimated).

Challenges Reaching Scale:

- *Infrastructure Constraints*: Network availability for sending/receiving text messages, rural mobile penetration rates
- *Willingness to pay for service*: Still working to determine optimum pricing
- *Field Capacity*: Expanding reach of marketing/sales teams, local software and design expertise
- *Trust Barrier*: Funds to expand national marketing campaigns, build brand recognition/trust
- *Partnerships*: Need to partner with organizations in need of market data (cooperatives, governmental organizations, agribusinesses)

Case Study: Reuters Market Light

Location: India **Created:** 2007 **User Base: ~**200,000

Background: Started by multinational company Thomson Reuters, Reuters Market Light (RML) provides farmers with customized and localized weather forecasts, crop prices, agricultural news and information via SMS. Currently reaching several hundred thousand farmers in 13 states in India and growing by 300-2500 subscriptions/day.

Customer Value Proposition:

- *Type of Offering:* Reuters Market Light services over 200,000 smallholder farmers in 10 states in India. Farmers receive 4-5 messages per day on prices, commodities and advisory services from a database with information on 150 crops and more than 1,000 markets.
- *Price:* Subscriptions cost $2-2.50 per month, $20 annual subscription.
- *Access: C*ustomers purchase prepaid scratch cards primarily through agricultural retailers. Operates on basic mobile phones, not linked to particular MNO.

Key Resources:

- *Partnerships:* Information sources through private network, national sources (market data and weather information), agricultural universities (crop advisory content). Built nearly 2000 weather stations to provide weather information. Partnerships: Idea Cellular, Indian Post Office, co-ops and agribusinesses.
- *Technology:* SMS on mobile phone, supports voice/WAP platform as well.
- *People:* 50 full-time employees, approx. 300 reporting staff

Key Processes:

- *R&D:* Operating model built from scratch, pilot project in 2008
- *Marketing:* Community education through local village demonstrations, internal sales and marketing, targeting village chiefs for word-of-mouth advertising
- *M&E:* Internal assessment only, no external impact assessment.

Cost/Revenue Model:

- *Cost Structure:* "Content reporters" generating price content, generally undergrad students working part-time. Marketing costs paid by distributors.
- *Revenue Structure:* Free subscription and activation, revenue from purchase of prepaid scratch cards.

Lessons Learned:

- Use simple/reliable technology and limit numbers of SMS per day
- Leverage existing distribution/content generation networks
- *Trust barrier*: high perceived quality due to high availability, simplicity of service, local language support and timing of information.
- R&D: Importance of trial and error process

Case Study: eChoupal

Location: India **Created:** 2000 **User Base:** 6,500 kiosks

Background: Developed in 2000 by ITC Ltd., a large consumer goods company in India, eChoupal provides a transparent purchasing channel, product supply and agricultural information to approx. 4,000,000 farmers in 30,000 villages.

Customer Value Proposition:

- *Type of Offering:* Social intermediary system. Sanchalaks (trusted farmers) provide agricultural services, insurance, recruitment and input/crop aggregation.
- *Price:* No cost for farmers, initial cost of kiosk set up borne by ITC
- *Access:* 1 kiosk for 600 farmers in 5km radius, approx. 30 retailers per kiosk

Key Resources:

- *Partnerships:* Over 100 industry partners including community leaders, Nokia Life Tools, agricultural traders, commodity suppliers and State Bank of India.
- *Technology:* Build on computer system with uninterrupted power supply, solar battery chargers, satellite internet.
- *People:* 1 ITC engineer for 80 kiosks, visiting one per month for IT support

Key Processes:

- *R&D:* Three phases of R&D and platform development (2000-2002, 2003-2007, 2008-present), strong community engagement through farmer groups
- *Marketing:* Kiosks operate through word-of-mouth, existing community relationships, broadcast on eChoupal radio.
- *M&E:* No M&E framework to date.

Revenue Model:

- *Cost Structure:* Cost of set-up/technology borne by ITC, 0.5% commission on agricultural transactions paid to kiosk operators (approx., $200-$4000/year for kiosk operators). Maintenance costs ~$100/year/kiosk.
- *Revenue Structure:* Increased revenues for ITC and retail partners through kiosk retail channel (2.5-10% increase).

Lessons Learned:

- *Community Interaction:* Overcome trust barrier by developing social capital model, allows for bundling additional services and co-creation of user interface.
- *Cost of Operation:* Kiosk system brings down cost of sourcing commodities and distributing agricultural inputs.
- *Leverage multiple technologies***:** radio marketing, computer-based back-end system. Potential for mobile distribution channels.
- *Bundle Services:* Comprehensive range of services/products offered to farmers.

Case Study: CKW

Location: Uganda **Created:** 2008 **User Base: ~**19,000 farmers

Background: Started by the Grameen Foundation in 2008, CKW provides famers with access to agricultural information via two-way phone communication, supported by village-based intermediaries. Links farmers, input providers and extension workers.

Customer Value Proposition:

- *Type of Offering:* Field agents work with farmers to identify needs, transmit data to agricultural experts and feed recommendations back to farmers. Services include weather alerts, crop advice, mobile money and data collection.
- *Price:* No fee for farmers for agricultural information/surveys, small fee for phone charging service ($0.12-0.20/charge). Transition to fee-for-service in future.
- *Access:* Farmers receive direct face-to-face interaction with field agents.

Key Resources:

- *Partnerships:* Gates Foundation, various agricultural research institutions, public sector partners (WFP), MNOs (MTN), limited private sector partnerships
- *Technology:* Smart-phone technology (voice, image, video and GPS) for field agents for information capture, SMS/Java-based data input, mobile internet communication channels, open source cloud computing back-end channel.
- *People:* 300 CKWs in 6 districts, supported by 30 headquarters staff

Key Processes:

- *R&D:* Piloted in 2009, prototypes and applications tested with end-users. Built on two-way communication channel, enabling continuous user feedback loop.
- *Marketing:* Advertising/marketing done by Grameen Foundation and MTN.
- *M&E:* No M&E system yet, first impact assessment planned in 2012.

Cost/Revenue Model:

- *Cost Structure:* Roughly $1m/year operating expenses. CKWs paid $10-30/month. Data cost reduced by using smartphone data, cheaper than SMS.
- *Revenue Structure:* Dependent mainly on donor/grant funds ($4.7m Gates Foundation grant). Only 10% costs currently covered by data capture/survey fees ($4-5/survey). Half of $500 start-up cost recovered by CKWs.

Lessons Learned:

- *Proper technology:* Smartphones for extension workers, cloud computing
- *Diversify revenue streams*: targeting 40% data collection, 60% fee for service, 50% equipment recovery over three years.
- *Willingness to pay:* Difficult to transition to fee-for-service if initially given for free
- *Partnerships:* Importance of bringing private sector partners on board at initial phases of development, partnering with larger farmer organizations.

Case Study: txteagle

Location: 80 countries **Created:** 2009 **User Base: ~**100,000

Background: Launched in 2009, txteagle allows mobile phone subscribers to earn small payments of airtime or money by performing simple mobile phone-based tasks. Currently working with 220 mobile operators in 80 countries. 40,000 users paid to date.

Customer Value Proposition:

- *Type of Offering:* Users receive small payments or airtime deposits in exchange for basic transcription/text entry services.
- *Price:* Revenue-generating activity for end-users
- *Access:* Works on basic mobile phone, requires phone access.

Key Resources:

- *Partnerships:* 220 MNOs (including Mobile Planet, Safaricom, MTN, Nokia)
- *Technology:* Propriety software allows MNOs to credit subscribers with small amounts of airtime in exchange for completing surveys or purchasing products. Utilizes UCMP platform (Universal Cellular Messaging Protocol).
- *People:* 6 engineers and management team in Boston. No field presence.

Key Processes:

- *R&D:* Pilot project in 2009, brought to scale in 2010. Continually improving wording of questions to improve response rates and
- *Marketing:* Little training needed. Users reached through mobile subscription service via text. Small amount of airtime transferred to convince initial user.
- *M&E:* No monitoring/impact measurement to date besides money transferred to users.

Cost/Revenue Model:

- *Cost Structure:* Compensation for end-user participation ($.50-1.00) for 5-30 minute job. Airtime costs borne by MNO partners.
- *Revenue Structure:* Clients pay for access to global information and research at low cost. Clients include market research firms, NGOs, international institutions and businesses. Currently revenues under $1m/year, aiming for breakeven in 2013.

Lessons Learned:

- High potential to leverage crowd-sourcing for simple data entry, information capture and survey response
- Importance of partnerships with MNOs

Case Study: M-PESA

Location: Kenya **Created:** 2007 **User Base: ~**13 million

Background: Launched in early 2007 by Vodafone affiliate Safaricom, M-PESA was the first mobile money transfer platform to reach significant success and scale. M-PESA allows customers to transfer funds to anyone with a mobile phone.

Customer Value Proposition:

- *Type of Offering:* Easy-to-use, safe and reliable mobile money transfer services allows payments to any user with a cell phone. Eliminates need for physical cash or bank branches. New services being developed, including linking to bank accounts, prepaid Visa cards, bill payment, mobile purchases, insurance.
- *Price:* No registration fees, deposit fees or minimum balance.
- *Access:* 23,000 individual agent stores for cash-in/cash-out purchases. Retail structure supported by "super agent" head offices.

Key Resources:

- *Partnerships:* Vodafone (Safaricome), Central Bank of Kenya, Equity Bank, initial funding from Department for International Development (DFID)
- *Technology:* SIM Application Toolkit, simple user interface on phone.
- *People:* 23,000 agent outlets

Key Processes:

- *R&D:* Customer feedback loop via direct call centers.
- *Marketing:* Full-scale national marketing campaign at launch, leveraging Safaricom brand. Simple initial value proposition: "Send Money Home". Viral marketing: price structure designed to encourage non-registered users to register
- *M&E:* No social impact assessment.

Cost/Revenue Model:

- *Cost Structure:* Flat commission for retail agents. $1,600 to set up retail agent.
- *Revenue Structure:* Project Level: $94m revenues per year (9% company revenues). Currently profitable. User level: No customer charges for SMSs, flat fee structure applied to transactions ($0.4 for bill payment, $0.7-1.00 for transfers, $0.013 for balance inquiries).

Lessons Learned:

- *Acceptance* facilitated by reliability, stable and simple price structure
- *Customer trust* facilitated by call center (for complaints) SMS confirmation of transactions, paper records of cash transactions.
- Initial funding via *public/private partnership* ($1.5m from DFID, $1.6m Vodafone)
- *Simple user interface*, clear value proposition, strong incentives
- Importance of *supportive banking/legal framework*

Case Study: IKSL

Location: India **Created:** 2005 **User Base: ~**3 million

Background: Developed by subsidiary of Indian Farmers Fertilizer Cooperative (IFFCO) and Bharti Airtel, India's leading MNO, to provide mobile agricultural information and services to rural farmers.

Customer Value Proposition:

- *Type of Offering:* SMS and voice-based agricultural advisory system. Subscribers provided with five 1-minute voice-based phone queries free every day. Agricultural experts help generate content and answers. Customers can access helpline service to receive farm advisory messages and input advice.
- *Price:* SIM cards priced on par with local SIMs
- *Access:* IKSL distributes Airtel SIM cards under the name "Green SIM" to farmers.

Key Resources:

- *Partnerships:* IFFCO (farmers cooperative), Bharti Airtel (MNO), GSMA (MNO)
- *Technology:* Build on voice technology and voice message system. IKSL schedules voice messages based on local agriculture systems. One-minute voice answers developed by agricultural experts prior to broadcast.
- *People:*

Key Processes:

- *R&D:* Pilot projects launched one year before full launch
- *Marketing:* Use of rural entrepreneurs as marketing tool
- *M&E: Unknown*

Cost/Revenue Model:

- *Cost Structure:* Cost of generating content borne by Airtel in exchange for expanded subscriber base and airtime use.
- *Revenue Structure:* $500,000 start-up grant provided by Gates Foundation. IKSL paid by Airtel for each new customer and based on customer talk time. Currently financially sustainable.

Lessons Learned:

- Thought about scale right away, partnered with Airtel, biggest provider of cell service, and IFCO, biggest fertilizer cooperative
- Allowed Airtel to enter market (benefit to partner), SIM cards from Airtel, pre-loaded with Ag system
- Became support tool to sell SIM cards
- Build on existing structures: ran into operational trouble because system was developed outside of existing market structures